REMARKS

The Applicants thank the Examiner for the thorough consideration given the present application. Claims 1-27 are pending. Claims 1-9 and 19-26 are amended, and claim 27 is added. Claim 1 is independent. Claims 10-18 are withdrawn. The Examiner is respectfully requested to reconsider the rejections in view of the amendments and remarks set forth herein.

Claim for Priority

It is gratefully acknowledged that the Examiner has recognized the Applicants' claim for foreign priority. In view of the fact that the Applicants' claim for foreign priority has been perfected, no additional action is required from the Applicants at this time.

Drawings

Two sheets of proposed drawing corrections, along with revised formal drawings are being submitted concurrently in a separate letter to the Official Draftsperson. In these, the label "Background Art" is added to FIGS. 1 and 2.

Rejection Under 35 U.S.C. § 112, 1st Paragraph

Claim 1 stands rejected under 35 U.S.C. § 112, 1st Paragraph. This rejection is respectfully traversed.

The Examiner states that the original specification does not disclose "at a concentration exceeding its doping level", as recited in claim 1.

In order to overcome this rejection, Applicants have amended claim 1 to recite "at a concentration of 1.2 x $10^{20}cm^{-3}$ or more." Support for this amendment can be seen in the specification, for example on page 8, lines 10-12, page 12, lines 3-9, and page 20, lines 3-15.

Applicants respectfully submit that the claims, as amended, are fully supported by and adequately described in the written description of the invention. Accordingly, reconsideration and withdrawal of this rejection are respectfully requested.

Rejection Under 35 U.S.C. § 112, 2nd Paragraph

Claims 1-26 stand rejected under 35 U.S.C. § 112, 2nd Paragraph as being indefinite. This rejection is traversed.

In order to overcome this rejection, Applicants have amended claims 1-26 to address each of the issues specifically pointed out by the Examiner. Applicants respectfully submit that the claims, as amended, particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Accordingly, reconsideration and withdrawal of this rejection are respectfully requested.

Rejection Under 35 U.S.C. §102(e)

Claims 1-9 and 19-26 stand rejected under 35 U.S.C. §102(e) as being anticipated by either Nagahama et al. (U.S. 6,172,382) or Kiyoku et al. (U.S. 6,153,010). These rejections are respectfully traversed.

While not conceding the appropriateness of the Examiner's rejections, but merely to advance prosecution of the instant application, Applicants respectfully submit that independent claim 1 has been amended to recite a combination of elements directed to a buffer including a plurality of first layers made of a nitride semiconductor containing an impurity at a concentration of $1.2 \times 10^{20}cm^{-3}$ or more and a plurality of second layers made of a nitride semiconductor containing no impurity, the first and second layers being laminated alternatively on each other and formed on the substrate to form a superlattice structure. Applicants respectfully submit that this combination of elements as set forth in independent claim 1 is not disclosed or made obvious by the prior art of record, including Nagahama et al. and Kiyoku et al.

None of the embodiments or examples in Nagahama et al. or Kiyoku et al. show or suggest an impurity or doping concentration of $1.2 \times 10^{20}cm^{-3}$ or more.

As noted by the Examiner, Nagahama merely disclose a layer doped with Si to $1 \times 10^{19}cm^{-3}$, and a layer doped with Mg to $1 \times 10^{20}cm^{-3}$. Further, Kiyoku et al. merely disclose a layer doped with Si at $5 \times 10^{18}cm^{-3}$. The range set forth in claim 1, as amended herein, does not overlap these values.

Moreover, Nagahama et al. and Kiyoku et al. require a very complicated process, such as photolithography to produce the low dislocation buffer layer. The low dislocation buffer layer, of the present invention, can be obtained by a much simpler, in-situ process, as explained in the specification on page 23, line 22 through page 24, line 16.

Added Claim 27

Added dependent claim 27 recites a threaded dislocation density substantially equal to 5 x 10^7 cm^{-2}. Support for this limitation can be found on page 6, lines 23-25 of the Specification.

Applicants respectfully submit that the combination of elements as set forth in independent claim 1 as well as the dependent claims is not disclosed or made obvious by the prior art of record, including Nagahama et al. and Kiyoku et al., for the reasons explained above. All claims are now in condition for allowance. Accordingly, reconsideration and withdrawal of this rejection are respectfully requested.

CONCLUSION

Since the remaining patents cited by the Examiner have not been utilized to reject claims, but merely to show the state of the art, no comment need be made with respect thereto.

All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. It is believed that a full and complete response has been made to the outstanding Office Action, and that the present application is in condition for allowance.

If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, he is invited to telephone Carl T. Thomsen (Reg. No. 50,786) at (703) 205-8000.

Pursuant to the provisions of 37 C.F.R. §§ 1.17 and 1.136(a), the Applicants respectfully petition for a one (1) month extension of time for filing a response in connection with the present application and the required fee of $110.00 is attached hereto.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§1.16 or 1.17, particularly extension of time fees.

Respectfully submitted,

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1794-0142P
Attachment
KM/CTT/mlr/mua

Attachment: Marked-Up Copy of Amendments

MARKED-UP COPY OF AMENDMENTS

1. (Amended) A [low dislocation] buffer formed between a substrate and a nitride semiconductor as a device material to be formed for constituting a device structure on said substrate, comprising:

a plurality of first [layer] layers made of a nitride semiconductor containing an impurity at a concentration [exceeding its doping level being laminated a predetermined number of times alternately with] of $1.2 \times 10^{20} cm^{-3}$ or more and a plurality of second [layer] layers made of a nitride semiconductor containing no impurity, the first and second layers being laminated alternatively on each other and formed on the substrate to form a superlattice structure.

2. (Amended) A [low dislocation] buffer as claimed in claim 1 wherein:

a concentration of [an] the impurity contained in a nitride semiconductor for forming said first layer is [from $10^{18} cm^{-3}$ to] 10% or less.

3. (Amended) A [low dislocation] buffer as claimed in any one of claims 1 and 2 wherein:

said impurity is Si (silicon), C (carbon), Mg (magnesium), or O (oxygen).

4 . (Amended) A [low dislocation] buffer as claimed in any one of claims 1 and 2 wherein:

a nitride semiconductor for forming said first layer or said second layer is a three-five nitride semiconductor.

5. (Amended) A [low dislocation] buffer as claimed in claim 3 wherein:

a nitride semiconductor for forming said first layer or said second layer is a three-five nitride semiconductor.

6. (Amended) A [low dislocation] buffer as claimed in any one of claims 1 and 2 wherein:

said substrate is made from Si (silicon), SiC (silicon carbide), $A1_2O_3$ (sapphire), or GaAs (gallium arsenide).

7. (Amended) A [low dislocation] buffer as claimed in claim 3 wherein:

said substrate is made from Si (silicon), SiC (silicon carbide), $A1_2O_3$ (sapphire), or GaAs (gallium arsenide).

8. (Amended) A [low dislocation] buffer as claimed in claim 4 wherein:

said substrate is made from Si (silicon), SiC (silicon carbide), $A1_2O_3$ (sapphire), or GaAs (gallium arsenide).

9. (Amended) A [low dislocation] buffer as claimed in claim 5 wherein:

said substrate is made from Si (silicon), SiC (silicon carbide), $A1_2O_3$ (sapphire), or GaAs (gallium arsenide).

19. (Amended) A device provided with a [low dislocation] buffer, comprising:

said [low dislocation] buffer being prepared by forming a [predetermined] device structure on the [low dislocation] buffer as claimed in any one of claims 1 and 2 with the use of a nitride semiconductor as a device material.

20. (Amended) A device provided with a [low dislocation] buffer, comprising:

said [low dislocation] buffer being prepared by forming a [predetermined] device structure on the [low dislocation] buffer as claimed in claim 3 with the use of a nitride semiconductor as a device material.

21. (Amended) A device provided with a [low dislocation] buffer, comprising:

said low dislocation buffer being prepared by forming a [predetermined] device structure on the [low dislocation] buffer as claimed in claim 4 with the use of a nitride semiconductor as a device material.

22. (Amended) A device provided with a [low dislocation] buffer, comprising:

said [low dislocation] buffer being prepared by forming a [predetermined] device structure on the [low dislocation] buffer as claimed in claim 5 with the use of a nitride semiconductor as a device material.

23. (Amended) A device provided with a [low dislocation] buffer as claimed in claim 19 wherein:

a nitride semiconductor that comes to be a device material for constituting said device structure is a three-five nitride semiconductor.

24. (Amended) A device provided with a [low dislocation] buffer as claimed in claim 20 wherein:

a nitride semiconductor that comes to be a device material for constituting said device structure is a three-five nitride semiconductor.

25. (Amended) A device provided with a [low dislocation] buffer as claimed in claim 21 wherein:

a nitride semiconductor that comes to be a device material for constituting said device structure is a three-five nitride semiconductor.

26. (Amended) A device provided with a [low dislocation] buffer as claimed in claim 22 wherein:

a nitride semiconductor that comes to be a device material for constituting said device structure is a three-five nitride semiconductor.

Claim 27 has been added.